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Attitudes to technology, perceived computer self-efficacy and computer anxiety as predictors of computer supported education

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ABSTRACT

There is a large body of research regarding computer supported education, perceptions of computer self-efficacy, computer anxiety and the technological attitudes of teachers and teacher candidates. However, no study has been conducted on the correlation between and effect of computer supported education, perceived computer self-efficacy, computer anxiety and attitude to technology and which additionally explains their relationship to each other. This research is conducted in order to test the effect levels among the latent variables of attitude to technology, perceived computer self-efficacy, computer anxiety and the attitude toward doing computer supported education and these latent variables' ratios to each other. For this, eight hypotheses were developed in light of theoretical information by reviewing the literature. This research is done by using Technology Attitude Scale, Perceived Computer Self-Efficacy Scale, Computer Anxiety Scale and The Attitude Scale toward Applying Computer Supported Education. The participant group of the research consists of 471 pre-service teachers. Exploratory factor analyses of scales were analyzed via SPSS 16.0 software. For the confirmatory factor analyses of scales and the structural equation modeling, AMOS 17.0 software was used. The most significant finding of this study is that attitude to technology, perceived computer self-efficacy and computer anxiety are important predictors of teacher candidates' attitude toward using computer supported education.

1. Introduction

Technology holds an important place in human life in a large variety of contexts from science to education, agriculture to commerce, transportation to communication and facilitates life and continues to develop. Of course, this advancement which occurred in technology supported the development of the first computers and as a result, the computer has become an inseparable part of our daily and educational life. As a matter of fact, it has been observed that in recent years, the use of information and communication technologies has become widespread in elementary education (Davies, Szabo, & Montgomerie, 2002). This situation also entails integration of technology into teacher training programs. For teachers to be able to integrate technology in an effective way, training programs should be formed based on national standards (Marra, 2004). In this context, Oztok & Ozdener (2005) argue that it is necessary for "technology education" at every level from elementary to higher education to be re-organized in accordance with the requirements of the era and to appear more predominantly in training programs. This is because some studies conducted on technology (Sevindik, 2006; Yilmaz, 2005) propose that using technological equipment in education has a positive effect on the academic achievement and attitudes of students.

The computer, which ranks among the most important products of technology, is the main tool of computer-supported education. Therefore, perceived computer self-efficacy among teachers and students plays an important part in applying computer supported education and achieving its goal. Self-efficacy is the principal concept of social learning theory, and entails that one should aware of him/herself and the individual should act according to the situation by comparing the performance that he/she is required to display with his/her

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performance (Korkmaz, 2006). Perce computer self-efficacy, which affects individuals' interests toward computers and their desire to use a computer, (Gurcan, 2005) also emphasizes that when facing difficulties in computer-related tasks, one should be determined to overcome these difficulties (Compeau & Higgins, 1995).

Another factor that is important in delivering computer supported education is computer anxiety. According to Spilberger (1972), anxiety is unpleasant, emotional and observable reactions such as sadness, perception and tension caused by stress-creating circumstances. In parallel to this definition, Maurer (1994) defines computer anxiety as "concern and fear experienced by an individual when he/she thinks that he/she is using computer technology or he/she is really using a computer". Computer anxiety introduces itself as a part of general anxiety and mostly appears as a sense of hesitation toward computers (Elfimova, 2008). In this regard, according to Ceyhan (2002), avoiding computers and areas where computers are present, preferring to use computers only briefly and taking excessive precautions while using them are present among behaviors seen in individuals who have computer anxiety.

Differences are experienced in the definition of computer supported education, which computer anxiety and perceived computer self-efficacy affects directly or indirectly. According to Arslan (2006), computer supported education is defined as the utilization of computers as a supplementary tool for teachers to enrich and improve the quality of learning provided during educational activities. The definition stating that "Computer supported education is the transfer of instructional content or activities to students via computer", which is made by Hannafin & Peck (1988) and among the most recognized definitions in this subject, is widely acknowledged in the literature.

Many studies have been conducted which explore the possibility that computer supported education increases the academic achievement of students (Camnalbur, 2008; Cavanaugh, 2001; Demirer, 2006; Drost, 2002; Duman, 2007; Egelioglu, 2008; Karakus, 2008; Shachar, 2002; Tankut, 2008; Wong, 2001; Zhou, Brouwer, Nocente, & Martin, 2005). However, in their study called "Can Computer Use Damage Scientific Achievement?", Papanastasiou, Zemblyas, & Vrasidas (2003) investigated the correlation between computer and scientific achievement and they inferred that essentially, using or not using computers has no positive or negative effect on student achievement.

Regardless of the benefits of computer supported education, it is seen that computer supported education has not been promoted at a desired level in the education process (Hu, Clark, & Ma; 2003; Marcinkiewicz, 1993; Muir-Herzig, 2004). Among the reasons present for this situation are concerns that students' interest will decrease toward lessons, classrooms being over-crowded and principals not allowing the use of computers (Yesilyurt, 2006). In addition, training given to teachers on how to use computers remains limited and they are not taught how to use computers in education (Cox, Preston, & Cox, 1999). Teachers have also reported not finding sufficient time to be able to use computers, taking into account the intensity of the curriculum, and have also reported not receiving adequate technical support (Waite, 2004). The aforementioned issues represent barriers to the development of computer supported education.

According to Becker (2001), factors such as technical knowledge and experience of the teacher, the number of computers in class, to what extent the teacher is interested in his/her own professional development and their educational philosophy determine whether computers will be used and how they will be used. Also, in the respective literature, attitudes are emphasized as being one of the most essential factors toward the raising of awareness among pre-service teachers (teacher candidates) regarding computer supported education so that they become successful in their duty (Shashaani, 1993). Teachers and teacher candidates' attitudes and self-efficacy perceptions concerning computer supported education is the primary factor to achieve success in computer supported education practice, which holds an important position in the educational system (Kutluca & Ekici, 2010).

Recognizing the effectiveness of computer supported education is possible when teachers having a positive attitude. The attitude that they have gained in the pre-service education process is of considerable importance. It has been detected in research that the most important determinant in teachers adopting computer supported education is the training that teachers have received related to computer technologies (Dupagne & Krendl, 1992; Torkzadeh, Pflughoeft, & Hall, 1999).

There are many studies regarding computer supported education, perceptions of computer self-efficacy, computer anxiety and the technological attitudes of teachers and teacher candidates (Akkoyunlu & Kurbanoglu, 2003; Becker & Maunsaiyat, 2002; Erdemir, Bakirci, & Eyduran, 2009; Frantom, Green, & Hoffman, 2002; Jegede, 2007; Oakes & Martin, 2002; Orhan 2005; Schumacher & Morahan-Martin, 2001; Shapkaa & Ferrarib, 2003; Tanguma, Martin, & Crawford, 2002; Usta & Korkmaz 2010; Yanik, 2010). In general, these studies were conducted in order to put forward opinions of participants regarding computer supported education, perceived computer self-efficacy, computer anxiety and technology attitude. On the other hand, the performed studies have concentrated on only one of these themes. It is theoretically known that technology attitude, perceived computer self-efficacy and computer anxiety influence computer supported education. But, no research has been found, which confirms the statistical accuracy of this theoretical information. In this study, perceived computer self-efficacy, computer anxiety and technology attitude's level of impact on computer supported education both separately and together, their explaining ratio and their statistical significance are dwelt upon. This situation also reveals this study's biggest difference and originality from similar studies that have been both stated above and appear in the literature. On the other hand, no study has been conducted on the correlation between and effect of computer supported education, perceived computer self-efficacy, computer anxiety and attitude to technology and their ratio to each other. For this reason, it is important to detect which variables affect teacher candidates' attitudes regarding computer supported education and to what extent changes in these attitudes are explained under which variables and it is also important to put forward a concrete model in this subject. Moreover, by beginning to use high-level analysis software (AMOS, Lisrel etc.) in the social sciences, the level of effect and explaining ratio of one or more independent variables on one or more dependent variables can be detected.

In this direction, based on theory, hypotheses developed to test the effect of the variables of attitude to technology, perceived computer self-efficacy, computer anxiety and the attitude toward adopting computer supported education on each other and their relation to each other are presented below.

H1. The attitude of pre-service teachers (teacher candidates) to technology positively and significantly affects perception of computer self-efficacy.

H2. Teacher candidates' attitude to technology significantly explains perception computer self-efficacy.